

Docket No. 396.43366X00
Serial No.10/750,822
December 2, 2005

REMARKS

Applicants have amended their specification, on page 3, to provide the correct volume number for the publication Chemical Review referred to on page 3, lines 14 and 15; and to delete references to the United States patent, Japanese patent publication and Soviet patent referred to on page 3, lines 15 and 16 of Applicants' specification. It is respectfully submitted that the chemical formulae set forth at page 3, line 17, of Applicants' specification have been provided by the present inventors, from the indication about various chemical reaction formulae between aldehyde and amine in the article in Chemical Review, Vol. 26, as in Applicants' presently amended specification. Accordingly, the correct article is being indicated, and references to the various patent documents are being deleted, on page 3 of the Applicants' specification.

Applicants have amended their claims in order to further clarify the definition of various aspects of the present invention. Specifically, Applicants have amended claim 1 to recite that the reaction product is produced by reaction of formaldehyde and an alkanolamine in a molar ratio within a range of "from 0.001 to" 0.8. Note, for example, the paragraph bridging pages 9 and 10 of Applicants' specification. Moreover, a typographical error has been corrected in claim 2.

In addition, Applicants are adding new claims 18-21 to the application. Claim 18, dependent on claim 1, further defines the range of the molar ratio of formaldehyde and alkanolamine, as set forth in the paragraph bridging pages 9 and 10 of Applicants' specification. Claim 19, also dependent on claim 1, recites that the reaction product is that produced by the reaction of formaldehyde and an alkanolamine other than methylolamine (note the sole full paragraph on page 3, and page 9, lines 16-24, of Applicants' specification). Claim 20, dependent on claim 2, further defines the formaldehyde, consistent with the description on page 3, lines 21

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and 22 of Applicants' specification; and claim 21, dependent on claim 1, further defines the photoresist stripping agent in terms of properties thereof (that is, capable of removing photoresist layers and photoresist residues without corroding substrates, wiring materials and insulating layers upon which the photoresist has been provided). Note, for example, the second full paragraph on page 2 of Applicants' specification.

Noting the election-of-species requirement in the Office Action mailed April 1, 2005, in the above-identified application, it is respectfully submitted that previously considered claims as presently amended, and newly added claims 18-21, read on the elected species.

Applicants respectfully traverse the rejection of the their claims under the second paragraph of 35 USC 112, as set forth in Item VIII on page 3 of the Office Action mailed June 2, 2005, insofar as this rejection is applicable to the claims as presently amended. Thus, claim 1 has been amended to recite a lower limit of the molar ratio of formaldehyde and alkanolamine reacted to form the reaction product of the photoresist stripping agent. In view of this lower limit of the ratio, it is respectfully submitted that the rejection under the second paragraph of 35 USC 112 is moot, in that the claims no longer include language "or less" but have a lower limit. Clearly, as can be appreciated by the Examiner, a "zero" amount of formaldehyde does not fall within the presently recited molar ratio.

Contentions by the Examiner in Item IX on page 4 of the Office Action mailed June 2, 2005, are noted. As presently amended, and again noting the lower limit for the molar ratio of formaldehyde and alkanolamine, Applicants respectfully traverse the conclusion by the Examiner that an amount of the newly obtained compound could be "in an infinitesimal amount". To the contrary, Applicants, in their specification as originally filed, set forth that a photoresist stripping agent that is

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particularly effective is produced where the molar ratio of formaldehyde/alkanolamine is more preferably 0.001-0.8; and, absent evidence or reasoning by the Examiner to the contrary, it is respectfully submitted that the Examiner must accept the averments in Applicants' specification with respect to providing the photoresist stripping agent.

Applicants respectfully submit that all of the claims presented for consideration by the Examiner patentably distinguish over the teachings of the prior art applied by the Examiner in rejecting claims in the Office Action mailed June 2, 2005, that is, the teachings of the U.S. patents to Koito, et al., No. 6,869,921, to Gatlin, No. 5,486,605 and to Dillon, No. 4,978,512, under the provisions of 35 USC 102 and 35 USC 103.

It is respectfully submitted that these references as applied by the Examiner would have neither taught nor would have suggested such a photoresist stripping agent as in the present claims, which includes the reaction product produced by reaction of formaldehyde and an alkanolamine in a molar ratio within a range of from 0.001-0.8. See claim 1.

In addition, it is respectfully submitted that these references would have neither disclosed nor would have suggested such photoresist stripping agent as in the present claims, having the reaction product as discussed in connection with claim 1, and further including an alkali compound (see claim 3), and/or an organic solvent (see claim 5), and/or an anticorrosion agent (see claim 7), and/or water (see claim 9); and/or including specific alkali compounds, organic solvents and anticorrosion agents as in claims 4, 6 and 8, respectively.

Furthermore, it is respectfully submitted that the teachings of the applied references would have neither disclosed nor would have suggested such photoresist stripping agent as in the present claims, having the reaction product as discussed

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previously in connection with claim 1, and, moreover, wherein the alkanolamine is at least one compound as set forth in claim 2 or is ethanolamine as in claim 16, and the formaldehyde is selected from the group consisting of formalin and paraformaldehyde (see claim 20) or is paraformaldehyde (see claim 17).

Moreover, it is respectfully submitted that the teachings of the applied references would have neither disclosed nor would have suggested the other features of the present invention, as in the remaining claims, including the reaction product as in claim 1, and moreover wherein the photoresist stripping agent includes amounts of components as in claim 10; and/or wherein the reaction product is a formaldehyde-monoethanolamine condensate or a formaldehyde-isopropanolamine condensate (see claim 11); and/or wherein the reaction product is produced by the method as in claim 12; and/or wherein the reaction product shows peaks by ^{13}C -NMR as in claim 13; and/or wherein the agent contains amounts of the reaction product as in claim 14, in particular as in claim 15; and/or wherein the molar ratio range is that set forth in claim 18; and/or wherein the reaction product is that produced by the reaction of formaldehyde and an alkanolamine other than methylolamine (see claim 19); and/or wherein the photoresist stripping agent is capable of removing photoresist layers and residues without corroding substrates, wiring materials and insulating layers upon which the photoresist has been provided (see claim 21).

The present invention is directed to a photoresist stripping agent, useful in stripping photoresists that have been utilized in lithographic production of devices such as integrated circuits, display devices, micromachines, DNA chips and microplants.

In conventional photoresist stripping, the photoresists are removed by alkaline stripping agents. However, as described in Applicants' specification, the photoresist

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stripping ability of known alkaline stripping agents is insufficient for recently developed fine processing and short-time treatment, in the production of, inter alia, semiconductor devices and liquid display panels. While various techniques have been attempted with proposed new stripping agents, such new stripping agents have various problems, including instability thereof and disadvantageously corroding materials such as wiring and insulating substrates upon which the photoresist is provided.

Against this background, Applicants have found that a photoresist stripping agent containing a reaction product that is produced by the reaction of formaldehyde and an alkanolamine in a molar ratio of 0.001-0.8 easily removes, at low temperatures and in a short period of time, photoresist layers, without corrosion of underlying materials. Note, in particular, page 2, lines 16-25 of Applicants' specification.

While not to be limited to any specific function of operation, the reaction product of the photoresist stripping agent according to the present invention is considered to achieve the photoresist stripping effect by bonding the reaction product to the photoresist to increase the solubility thereof, thus facilitating removal of the photoresist. Note the paragraph bridging pages 10 and 11 of Applicants' specification.

Koito, et al. discloses a stripping composition for removing unnecessary substances such as a resist left after etching, and an etching residue, the stripping composition including at least one of alcohols having an ether-bond in the molecule thereof as component (a) and an anticorrosive as component (b). See column 3, lines 54-56. Note also column 3, line 57 to column 5, line 26. See also column 8, lines 36-42, describing various anticorrosive materials for the component (b). In column 9, lines 23-27, additional components which can be included in the stripping

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composition are disclosed, which can include amines, various amines being described in column 9, lines 43-46.

It is respectfully submitted that Koito, et al. does not disclose, nor would have suggested, such a photoresist stripping agent including the reaction product of the present claims, produced by reaction of formaldehyde and an alkanolamine in a molar ratio within a range of from 0.001-0.8, and advantages thereof.

With respect to Koito, et al., the Examiner has focused on the language "or less" as in the previously considered claims, and alleges in the last paragraph on page 5 of the Office Action mailed June 2, 2005, that "there is no evidence on the record that a new compound is [obtained] with an alkanolamine alone or no amount of formaldehyde as broadly claimed". However, as presently claimed, the ratio does not include zero, and an amount of formaldehyde is required so as to satisfy the recited molar ratio. Accordingly, it is respectfully submitted that the basis for rejection over the teachings of Koito, et al., either under the 35 USC 102(a) or 103(a) as set forth under Item X on page 5 of the Office Action mailed June 2, 2005, or under Item XI on pages 6 and 7 thereof, is moot.

Gatlin discloses compositions useful for converting hydrogen sulfide or other organic sulfides such as mercaptans from fluid streams, the converter comprising a reaction product of sterically hindered amines such as selected aliphatic diamines, aliphatic triamines, amino alcohols and mixtures thereof with aldoses. See column 2, lines 43-47. Note also column 2, lines 48-53; column 3, lines 44-51; and column 4, lines 9-11, 26 and 27.

Initially, it is noted that Gatlin discloses a hydrogen sulfide or organic sulfide converter. It is respectfully submitted that this reference does not disclose, nor would have suggested, a photoresist stripping agent as in the present claims. In addition, it is respectfully submitted that Gatlin would have neither taught nor would

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have suggested such agent including the reaction product produced by the reaction of formaldehyde and alkanolamine in a molar ratio in a range of from 0.001-0.8, as in the present claims.

As with Koito, et al., the Examiner has focused on the language of a molar ratio of 0.8 "or less", in the previously considered claims. However, and as discussed previously, such focus is moot in light of the range as in the present claims.

Dillon discloses a method and composition for sweetening gaseous and/or liquid hydrocarbon streams, for reducing the hydrogen sulfide and organic sulfide levels in such streams. The composition comprises the reaction product of (i) a lower alkanolamine with (ii) a lower aldehyde. Note column 3, lines 47-53. See also column 4, lines 16-25, for description of the lower alkanolamines and the lower aldehydes. Note also column 4, lines 34-38. This patent further discloses at column 4, lines 42-46, that in the reaction of (i) a lower alkanolamine and (ii) and a lower aldehyde, the relative molar ratios of (i) to (ii) may be from about 1:0.25 to about 1:10, preferably from about 1:1 to about 1:1.5. See column 4, lines 42-46. Note also column 6, lines 41-49.

As with Gatlin, It is noted that Dillon discloses a composition for selectively reducing levels of hydrogen sulfide and organic sulfides. It is respectfully submitted that this disclosure would have neither taught nor would have suggested the photoresist stripping agent as in the present claims, or the specific molar ratio of formaldehyde and alkanolamine which are reacted in forming the reaction product: Included in the photoresist stripping agent of the present claims.

The contention by the Examiner that the intended use with respect to photoresist stripping in the preamble "has no value" is respectfully traversed. It is respectfully submitted that recitation of "photoresist stripping agent" gives life and

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meaning to the claims, and must be considered in determining patentability. See
Kropa v. Robie, 88 USPQ 478 (1951).

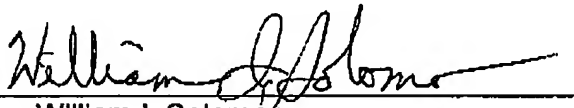
As shown in the foregoing, it is respectfully submitted that generic claim 1
should now be allowed. Accordingly, it is respectfully submitted that the non-elected
species should be rejoined and allowed in the above-identified application.

In view of the foregoing comments and amendments, reconsideration and
allowance of all claims presently pending in the above-identified application are
respectfully requested.

Applicants request any shortage of fees due in connection with the filing of
this paper be charged to the Deposit Account of Antonelli, Terry, Stout & Kraus, LLP,
Deposit Account No. 01-2135 (case 396.43366X00), and credit any excess fees to
such Deposit Account.

Respectfully submitted,

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